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"Breathable thermoplastic polymer casing for stuffing food products"
(Hengittävä polymeerisuoli elintarvikkeiden pakkaamiseen)

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Breathable thermoplastic polymer casing for stuffing food products

This invention relates to a food casing and more particularly to a breathable polymer food casing for stuffing food products, such as meat products like dry sausages and to a method for the manufacture thereof. Additionally, the present invention relates to the use of a film or casing which is permeable to water vapour for dehydrating and/or maturing food products and more particularly to the use of films which are permeable to water and which are continuous, that is to say which do not comprise perforations.

Food casings formed from synthetic materials and particularly from regenerated cellulose are widely used in the preparation of processed meat products such as sausage products and they replace earlier used casings formed from natural materials. A fibrous casing consists of a fibrous web formed into a tube and impregnated with regenerated cellulose. Differences in meat products, sausage recipes and modes of processing make it difficult to provide a casing that is suitable for all types of sausage products. Dry sausages, such as salami and the like, are usually processed by maturing for extended periods of time rather than cooking. The manufacture and maturing process of dry sausages is a complex interaction of so-called internal control variables e.g. recipe and external control variables e.g. climate. The internal control variables comprise common salt and sugar content, fat content, degree of comminution, casing and starter cultures. The external control variables comprise relative humidity, temperature and air velocity. A bacterial pure culture i.e. a starter culture is used to ensure the designed colour formation and to produce acids, mainly lactic acid that lower the pH value. Curing takes usually place in a smoke oven, often called a climatic chamber. The ability of meat to bind its own water is weakened because of the lowered pH value and because the relatively high salt content controls the lowering of the pH value. As a result of the lowered pH value, the salt content and the external control variables, meat products like sausages mature. Thus water is released from the meat, then it is diffused from the core of the sausage to the surface and finally evaporated through the casing. In order to permit moisture to be removed and to enable smoke to be accessible to the sausage, the

casing must be permeable to moisture and gases. Casings of the fibrous type are commercially available for the processing of a variety of dry sausages.

EP 850,567 discloses a process for the manufacture of cellulose containing casings which are suitable for sausages such as salami. The conditions, especially conditions after maturing of dry sausages are sometimes found to result in the growth of undesirable mold and fungi on the tubular, fibrous cellulosic casings producing cellulolytic enzymes that cause deterioration of the casings and which can render the sausage product unsaleable. Also the removal of possible extrenuous material is difficult from the fibrous casings because the use of water is undesirable in connection with fibrous casings.

It is sometimes difficult to peel the fibrous casing from the sausage without breaking the casing and at worst, only separate pieces can be pulled off. The manufacturing process of fibrous casings requires several different steps and especially the problems associated with environmental aspects such as emissions of volatile organic compounds make the process for the manufacture of fibrous casings unattractive. When fibrous casings are used, usually an adhesion substance, such as epichlorohydrine, is needed in order to achieve the adhesion of the meat mass to the inner surface of the casing.

Solutions to the problems associated with fibrous casings in connection with dry sausages have been proposed in several publications.

US 4,780,326 discloses a composition for making pigmented protective coatings on meat products, which coatings are based on acetylated monoglycerides and cellulose esters with additional synthetic waxes and pigments. Raw sausages are dipped into the melted composition and allowed to be dried.

US 3,935,320 discloses a tubular cellulosic casing with a kationic thermosetting resin coating which exhibits resistance to degradation by cellulolytic enzymes.

Traditional plastic casings which comprise polyester or nylon are widely used in the manufacture of stuffed food products, like cooked sausages and other moist type of sausages, which require that moisture is retained during processing and storage, thus necessitating the use of casings which are substantially impermeable. It is evident that impermeable plastic casings are not suitable for the manufacture of dry sausages such as salami or pepperoni where moisture, smoke and gas permeability are very important features of the casings. Commonly, dry sausages are manufactured into permeable fibrous casings, collagen casings, cellophane casings or natural casings. Based on the above, it can be seen that there exists a need for a casing especially suitable for stuffed meat products, such as dry sausages, which casing is easy, environmentally safe and acceptable to manufacture and which exhibits required moisture, smoke and gas permeability.

The prior art has disclosed films which are leaktight to liquid water and permeable to water vapour. Provision was first of all made for microperforated polyethylene films, the holes of which are sufficiently small to prevent the passage of water drops and sufficiently large to allow the passage of water vapour. As regards the polyethylene part, it is leaktight to liquid water and to water vapour. These films have the disadvantage of not keeping out bacteria or viruses.

EP 378,015 discloses films composed of a copolymer with polyamide blocks and polyether blocks. These films are continuous, that is to say that they do not have perforations, they are leaktight to liquid water and allow the passage of water vapour. Depending on the nature of the polyether, the moisture vapour transmission rate (MVTR) (also known as MWTR for Moist Water Transmission Rate) is higher or lower. The use was disclosed of these films to protect insulating materials which are under the roofs of houses; humidity is lost and the water which might infiltrate under the tiles or the slates cannot wet the insulating materials.

EP 688,826 discloses films composed of copolymers with polyether blocks as a mixture with copolymers of ethylene and of an alkyl (meth)acrylate. They are leaktight to liquid water and permeable to water vapour and, as regards copolymers with polyamide blocks

and polyether blocks, they exhibit the advantage with respect to the preceeding prior art (i) of having the same permeability for a lower water uptake, (ii) of being readily extrudable and (iii) of being able to be easily hot-bonded to a woven or non-woven.

EP 737,709 discloses packagings composed of a film made of copolymer with polyamide blocks and polyether blocks; they have the property of being permeable not only to water vapour but also to oxygen, to CO_2 and to ethylene. These packagings make possible the preservation of freshly harvested fruit and vegetables.

EP 803,348 discloses packagings composed of two layers of copolymers with polyether blocks, one highly permeable to water vapour and the other weakly permeable. This technique makes it possible to prevent the presence of condensation within the packaging. The copolymers with polyether blocks are advantageously chosen from polyether-polyamide block copolymers, polyether-polyester block copolymers and polyether-urethanes.

WO 98/26004 discloses packagings composed of a film made of a mixture (i) of a copolymer with polyether blocks, (ii) of a polyethylene with a relative density of less than 0.91 and (iii) of a compatibilizing agent. By adjusting the proportions of the various constituents, films are obtained which have specific values of permeability to water vapour, to oxygen and to CO_2. These different films are of use in different kinds of preservation.

Patent **EP 829,506** discloses other films composed of a polyurethane, a copolymer with polyamide blocks and polyether blocks having been added to this polyurethane; this film is permeable to water vapour and impermeable to liquid water.

Patent **EP 842,969** discloses films composed of a mixture (i) of polyamide, (ii) of a copolymer with polyamide blocks and polyether blocks, and (iii) of an optionally functionalized polyolefin, the proportion by weight of (i) being less than 50% and the proportion of (i)+(ii) being greater than 50%. This film is permeable to water vapour and impermeable to liquid water.

Patent **WO 99/07769** discloses masterbatches (i) of copolymer with polyamide blocks and polyether blocks, (ii) of a functional copolymer, such as a styrene-maleic anhydride, and (iii) of a polyolefin which are intended to be added to polyolefins. The resulting mixture is used to prepare films which are permeable to water vapour, to CO_2 and to oxygen and impermeable to liquid water.

Patent **EP 848,019** discloses films composed of a copolymer of ethylene and of a polyethylene glycol (meth)acrylate. These films are permeable to water vapour and impermeable to liquid water.

Patent **EP 476,963** discloses films composed of a mixture (i) of a copolymer with polyamide blocks and polyether blocks which are hydrophilic, (ii) of a hydrophobic polymer which can be the preceding copolymer but with hydrophobic polyether blocks or a polyamide or a polyurethane, and (iii) optionally of a compatibilizing agent. The film is permeable to water vapour and impermeable to liquid water and has a low water uptake.

Patent **EP 91,800** discloses dressings based on a film composed of a copolymer with polyamide blocks and polyether blocks which film is permeable to water vapour and which keeps out bacteria. This dressing is used to protect, from infections, wounds which have not yet healed while drying them but while not drying them too quickly. This is because, if drying is too fast, healing takes place while the wound is still suppurating.

The prior art has not disclosed the dehydration and/or maturing of food products using a continuous film as a packaging.

The object of the invention is to provide a moisture (water vapour), smoke and gas permeable, breathable polymer casing and/or film for stuffed food products, such as meat products like sausages and ham. A further object of the invention is to provide a method for the manufacture of such casings and/or film. A further object of the

invention is the use of the moisture and gas permeable, continuos casing and/or film for the manufacture of stuffed food products, such as meat products, like dry sausages and ham.

Characteristics of the casing and/or film, of the method for the manufacture thereof and of the use of the casing and/or film are stated in the claims.

The objects of the invention are achieved and the disadvantages of the films and casings according to the prior art are avoided or significantly decreased with the method and the casing and/or film according to the invention. The invention relates particularly to food products which have to be matured and/or completely or partially dehydrated, this dehydration constituting a stage in their preparation. It concerns, for example, foodstuffs, such as meat products like dry sausages and ham, and fish products. The present invention also relates to the use of a continuous packaging film or casing which is permeable to water vapour and impermeable to liquid water for completely or partially dehydrating and/or maturing food products. The term "continuous" means that the film or casing is not perforated.

It has been surprisingly found that casings based on certain polymers can be used in the manufacture of special types of food products which require moisture (water vapour), smoke and gas permeability of the casings. Especially suitable polymers are thermoplastic polymers made of flexible polymers and rigid polyamides such as polyether block amides. The thermoplastic polymers are breathable to water vapour and they are also permeable to other gases such as smoke, CO_2 or O_2. On the other hand, they are impermeable to microbes keeping out bacteria and viruses. Casings and films manufactured from the thermoplastic polymers have good mechanical properties such as tensile strength, elongation at brake, a good smooth finish, and they are resistant to the hydrolysis and deterioration by cellulolytic enzymes. The casings and films can be manufactured into desired forms, such as tubular casings, by extrusion methods using any suitable extrusion equipment known in the art. The casing can also be manufactured by blowing or casting films which can be sealed to any desired form. The casing or film can be oriented or unoriented and it can be manufactured as a single layer casing or as a

multilayer casing with two or more layers. The multilayer casing or film can be preferably coextruded, comprising the same polymer or a different polymer in each layer or combinations of polymers, thus making it possible to manufacture casings with varying moisture permeability. Additives such as antiblocking agents like silica, pigments and other additives known in the art, such as plasticizers, antioxidants or UV stabilizers, may be incorporated into the casings or films or used in connection with them.

A suitable thermoplastic polymer is a polymer having polyether chains and with a moisture vapour transmission rate (MVTR) of more than 500 g /m^2 / 24 hours, preferably 1000 - 20,000 g/m^2 /24 hours when measured using the ASTM E96 BW method.

The film or casing is advantageously based on a polymer having polyether chains, it being possible for these chains to be side chains (copolymer B) or to be blocks (or sequences) in the main chain (copolymer A) or to be present as side chains or as blocks.

Mention may be made, as an example of a polymer having polyether side chains, of copolymers of ethylene and of a polyalkylene glycol (meth)acrylate, such as those disclosed in Application **EP 848,019**, the contents of which are incorporated in the present application.

Mention may be made, as an example of a polymer A having polyether blocks, of the copolymer (A) of Application **WO 98/26004** which means a block copolymer in which polyoxyalkylene chains and other polymer chains are linked together, or a polymer in which polyoxyalkylene chains are connected together via coupling regions.

The polyether blocks comprise alkylene oxide units which can be chosen from ethylene oxide, propylene oxide and -CH_2-CH_2-CH_2-CH_2-O-. The permeability increases with the proportion of polyether and with its nature. The greater the amount of polyethylene glycol, the greater the permeability to water vapour.

The polyether blocks can represent 5 to 85% by weight of (A). The polyether blocks can comprise other units than ethylene oxide units, such as, for example, propylene oxide or polytetrahydrofuran, which results in polytetramethylene glycol linkages. It is also possible simultaneously to use PEG blocks, that is to say those composed of ethylene oxide units, PPG blocks, that is to say those composed of propylene oxide units, and PTMG blocks, that is to say those composed of tetramethylene glycol units, also known as polytetrahydrofuran blocks. Use is advantageously made of PEG blocks or of blocks obtained by oxyethylation of bisphenols, such as, for example, bisphenol A. The latter products are disclosed in Patent EP 613,919. The amount of polyether blocks in (A) is preferably from 10 to 50% by weight of (B).

Advantageously, (A) is a copolymer with polyamide blocks and polyether blocks.

Polymers with polyamide blocks and polyether blocks result from the copolycondensation of polyamide sequences comprising reactive ends with polyether sequences comprising reactive ends, such as, inter alia:

1) polyamide sequences comprising diamine chain ends with polyoxyalkylene sequences comprising dicarboxylic chain ends,
2) polyamide sequences comprising dicarboxylic chain ends with polyoxyalkylene sequences comprising diamine chain ends obtained by cyanoethylation and hydrogenation of α,ω-dihydroxylated aliphatic polyoxy-alkylene sequences, known as polyetherdiols,
3) polyamide sequences comprising dicarboxylic chain ends with polyetherdiols, the products obtained being, in this specific case, polyetheresteramides.

Polyamide sequences comprising dicarboxylic chain ends originate, for example, from the condensation of α,ω-aminocarboxylic acids, of lactams or of dicarboxylic acids and diamines in the presence of a chain-limiting dicarboxylic acid. The polyamide blocks are advantageously made of polyamide-12.

The number-average molar mass of the polyamide sequences is between 300 and 15,000 and preferably between 600 and 5000. The mass of the polyether sequences is between 100 and 6000 and preferably between 200 and 3000.

The polyamide blocks and polyether blocks can also comprise randomly distributed units. These polymers can be prepared by the simultaneous reaction of the polyether and of the precursors of the polyamide blocks.

For example, polyetherdiol, a lactam (or an α,ω-amino acid) and a chain-limiting diacid can be reacted in the presence of a small amount of water. A polymer is obtained which has essentially polyether blocks and polyamide blocks of very variable length but also the various reactants which have reacted randomly, which are statistically distributed along the polymer chain.

These polymers with polyamide blocks and polyether blocks, whether they originate from the copolycondensation of polyamide and polyether sequences prepared beforehand or from a one-stage reaction, exhibit, for example, Shore D hardnesses which can be between 20 and 75 and advantageously between 30 and 70 and an intrinsic viscosity between 0.8 and 2.5, measured in meta-cresol at 25°C for a starting concentration of 0.8 g/100 ml.

Whether the polyether blocks derive from polyethylene glycol, polypropylene glycol or polytetramethylene glycol, they are either used as is and copolycondensed with polyamide blocks comprising carboxylic ends or they are aminated, in order to be converted into polyetherdiamines, and condensed with polyamide blocks comprising carboxylic ends. They can also be mixed with polyamide precursors and a chain-limiting agent in order to form polymers with polyamide blocks and polyether blocks having statistically distributed units.

The polyether can be, for example, a polyethylene glycol (PEG), a polypropylene glycol (PPG) or a polytetramethylene glycol (PTMG). The latter is also known as polytetrahydrofuran (PTHF).

Whether the polyether blocks are in the chain of the polymer with polyamide blocks and polyether blocks in the form of diols or of diamines, they are known for simplicity as PEG blocks or PPG blocks or PTMG blocks.

It would not be departing from the scope of the invention if the polyether blocks comprised different units, such as units derived from ethylene glycol ($-OC_2H_4-$), from propylene glycol

$$-O-CH_2-\underset{\displaystyle CH_3}{\underset{|}{CH}}-$$

or from tetramethylene glycol ($-O-(CH_2)_4-$).

The polymer with polyamide blocks and polyether blocks preferably comprises a single type of polyamide block and a single type of polyether block. Use is advantageously made of polymers with PA-12 blocks and PEG blocks and of polymers with PA-12 blocks and PTMG blocks.

Polymers with PEG blocks have a much greater permeability to water vapour than that of polymers with PTMG blocks.

Use may also be made of a mixture of these two polymers with polyamide blocks and polyether blocks.

The polymer with polyamide blocks and polyether blocks is advantageously such that the polyamide is the major constituent by weight, that is to say that the amount of polyamide which is in the form of blocks and that which is optionally statistically distributed in the chain represents 40% by weight or more of the polymer with polyamide blocks and polyether blocks. The amount of polyamide and the amount of polyether are advantageously in the ratio (polyamide/polyether) 1/1 to 3/1 and preferably:

The films of the invention have a thickness, for example, of between 10 and 150 μm.

The copolymers (A) and (B) can also be mixed with two or more polymers, like polyamides or polyolefins, having different types and/or ratios of soft/hard segments in each resin, or again there may be used blends with other resins providing that the amount is within a range such that the objectives of the present invention are realised.

The manufacturing process of the films or casings according to the invention is simple and it presents no environmental problems related to emissions of volatile organic compounds or undesirable smells. The polymer leftovers from the manufacturing process can be recycled to the process and practically no waste is formed. Food products requiring moisture and gas permeability of the casing or film, such as dry sausages like salamis, pepperonis and the like, can easily be manufactured in the casings or films according to the invention. The casings or films can be in a tubular form which is sealable with metal clips or other known method or they can be heat-sealed, or they can be in flat film that is sealable to a desired form.

Another advantage of the invention relates to substances which have to be packaged in order to be shaped during their preparation, this packaging also serving, in the following stage, subsequently to completely or partially dehydrate them. Thus meat products, such as salami, may be manufactured by extrusion of a meat mass into a tube, the dehydration and/or maturing subsequently having to be provided by this tube. Surprisingly, the dry sausages packed in casings or films according to the invention are readily smokable just like dry sausages in conventional fibrous casings. The food product may be subjected to smoke or it may also be matured and/or dehydrated without smoke.

In the manufacture of dry sausages like salami no adhesion substances like epichlorohydrine is needed. The sausages can be cleaned and rinsed with water if needed without harming the product. The moisture and gas permeability of the casings or films can be varied depending on the food product. The thermoplastic polymer casings and films according to the invention are easily peelable leaving a smooth surface on the food product like sausage.

The invention is further illustrated in the followings examples which however are not meant to limit the scope of the invention.

Example 1

Salami type sausage was manufactured using an extruded thermoplastic polymer casing comprising copolymer with polyamide 12 blocks with molecular weight of 4500 and with PEG blocks with a molecular weight of 1500, and MFI between 4 and 8 (235°C under 1 kg), with an extrusion diameter of 75 mm. As a reference casing a conventional fibrous casing with an extrusion diameter of 70 mm was used. The following experimental parameters expressing the quality of dry sausages were monitored during the maturing process:

1. Acidity degree (pH value)
2. Firmness
3. Weight loss

The pH values of the sausages were measured every day during the first three days and then after the sausages had matured. Firmness was controlled to ensure that a drying ring had not occurred and that the sausages were acceptable. The weight loss of dry sausage during ripening is normally expressed as a percentage, the weight determined at the time of sampling being related to the initial weight on the day of manufacture. After 60 hours, the pH value of the test sausage varied between 4.8 and 4.9 and the pH value of the reference sausage varied between 4.7 and 4.8. The typical red colour for a dry sausage was developed in a normal way within 36 hours. The weight loss is presented in the following Table 1.

Table 1

Weight loss of salami sausage manufactured in thermoplastic polymer casing.

Time (days)	Weight loss (%)
2.5	2.9
6.5	8.2
7.5*	10.3
10.5	17.5
13.5	21.4
15.5	23.8
17.5	25.3
20.5	27.7
24.5	30

* after maturing warehousing started

The maturing time of 24—25 days to the weight loss of 30 % is a normal time for a dry sausage with this diameter.

The weight loss of sausages in fibrous casings and in thermoplastic polymer (plastic) casings is presented in the following diagram 1.

Diagram 1.

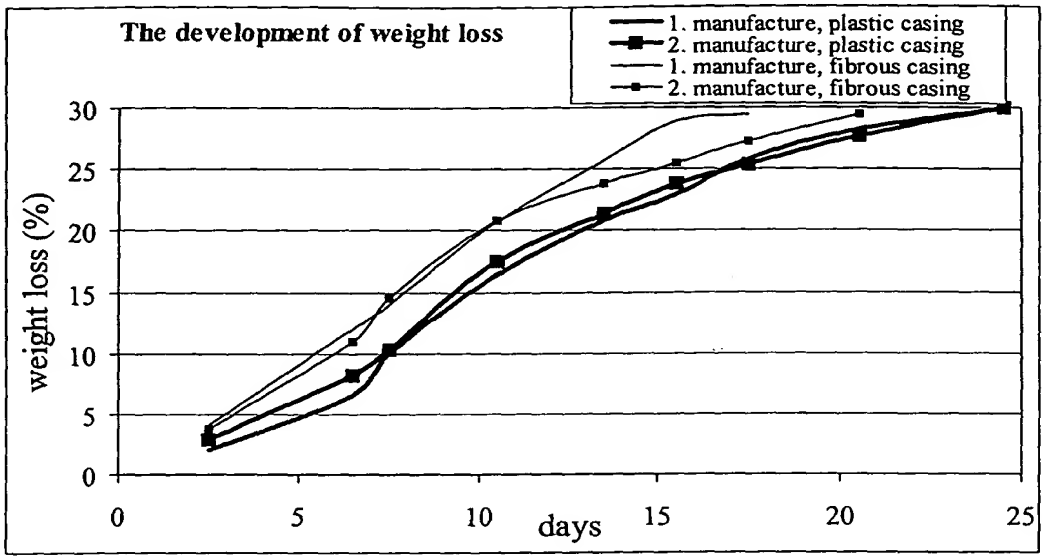

Table 2 shows the consistence (hardness) of the sausage during maturing. The measuring of consistence was performed in order to ensure that a so-called drying-ring was not formed to the product during maturing. Hardness is measured by pressing the measuring head (⌀ 10 mm) to the depth of 10 mm with respect to the horizontal direction of the peeled sausage. The numerical value obtained expresses the magnitude of force required to press the measuring head to a specified depth. Three parallel measurements were performed.

Table 2

Development of consistence (hardness)

Weight loss, %	Plastic casing, 1	Fibrous casing, 1	Plastic casing, 2	Fibrous casing, 2
20	5.7–6.0 kg	6.6–7.4 kg	6.4 kg	6.8 kg
25	not measured	not measured	6.8–8.4 kg	7.2–8.2 kg
30	11.5 kg	12.5 kg	8.5–9.8 kg	10 kg

The salami sausage in the thermoplastic polymer casing was more easily peelable than the corresponding salami sausage in the fibrous casing. The taste and the flavour of the ready-made salami packed in the polymer were typical of a salami of good quality.

Claims

1. A breathable polymer casing and/or film for stuffing food products, **characterized** in that the casing and/or film comprises thermoplastic polymer having polyether chains and with a moisture vapour transmission rate (MVTR) of more than 500 g/m^2/24 hours, preferably 1000 - 20,000 g/m^2/24 hours measured by the ASTM E96 BW method.

2. A breathable polymer casing and/or film according to claim 1, **characterized** in that the thermoplastic polymer comprises polyamide blocks and polyether blocks.

3. A breathable polymer casing and/or film according to claim 1 or 2, **characterized** in that the thermoplastic polymer comprises a polymer with polyamide 12 blocks and with polyethylene glycol blocks or polypropylene glycol blocks or polytetramethylene glycol blocks or mixtures thereof, preferably polyethylene glycol blocks.

4. A breathable polymer casing and/or film according to any one of claims 1 - 3, **characterized** in that the number-average molar mass of the polyamide sequences is between 300 and 15,000 and preferably between 600 and 5000, and the mass of the polyether sequences is between 100 and 6000 and preferably between 200 and 3000.

5. A breathable polymer casing and/or film according to any one of claims 1 - 4, **characterized** in that the casing and/or film is oriented or unoriented and it comprises one or two or more layers, and the layers comprise the same polymer or different polymers.

6. A breathable polymer casing and/or film according to any one of claims 1 - 5, **characterized** in that the casing and/or film is permeable to smoke, CO_2, O_2 and other gases and impermeable to microbes.

7. A breathable polymer casing and/or film according to any one of claims 1 - 6, **characterized** in that the casing and/or film is smokeable.

8. A breathable polymer casing and/or film according to any one of claims 1 - 7, **characterized** in that the casing and/or film is resistant to deterioration by cellulolytic enzymes.

9. A breathable polymer casing and/or film according to any one of claims 1 - 8, **characterized** in that the food products are meat products or fish products, preferably dry sausages or ham.

10. Method for the manufacture of a breathable polymer casing and/or film for stuffing food products, **characterized** in that the casing and/or film is extruded, casted or blown.

11. Method for the manufacture of a breathable polymer casing and/or film for stuffing food products according to claim 10, **characterized** in that the casing and/or film is oriented or unoriented.

12. Method for the manufacture of a breathable polymer casing and/or film for stuffing food products according to claim 10 or 11, **characterized** in that the casing comprises one or two or more layers which are extruded or coextruded and the layers comprise the same polymer or different polymers.

13. Method for the manufacture of a breathable polymer casing and/or film for stuffing food products according any one of claims 10 - 12, **characterized** in that the food products are meat products or fish products, preferably dry sausages or ham.

14. Use of breathable polymer for casings and/or films for food products, **characterized** in that the casing and/or film comprises thermoplastic polymer having polyether chains and with a moisture vapour transmission rate (MVTR) of more than 500 $g/m^2/24$ hours, preferably 1000 - 20,000 $g/m^2/24$ hours measured by the ASTM E96 BW method.

15. Use of breathable polymer for casings and/or films for food products according to claim 14, **characterized** in that the thermoplastic polymer comprises polyamide blocks and polyether blocks.

16. Use of breathable polymer for casings and/or films for food products according to claim 14 or 15, **characterized** in that thermoplastic polymer comprises a polymer with polyamide 12 blocks and with polyethyleneglycol blocks or polypropylene glycol or polytetramethylene glycol or mixtures thereof, preferably polyethylene glycol.

17. Use of breathable polymer for casings and/or films for food products according to claims 14 - 16, **characterized** in that the number-average molar mass of the polyamide sequences is between 300 and 15,000 and preferably between 600 and 5000, and the mass of the polyether sequences is between 100 and 6000 and preferably between 200 and 3000.

18. Use of breathable polymer for casings and/or films for food products according to claims 14 - 17, **characterized** in that the casing and/or film is oriented or unoriented and it comprises one or two or more layers, and the layers comprise the same polymer or different polymers.

19. Use of breathable polymer for casings and/or films for food products according to claims 14 - 18, **characterized** in that the casing and/or film is permeable to smoke, CO_2, O_2 and other gases and impermeable to microbes.

20. Use of breathable polymer for casings and/or films for food products according to claims 14 - 19, **characterized** in that the casing and/or film is smokeable.

21. Use of breathable polymer for casings and/or films for food products according to claims 14 - 20, **characterized** in that the casing and/or film is resistant to deterioration by cellulolytic enzymes.

22. Use of breathable polymer for casings and/or films for food products according to claims 14 - 21, **characterized** in that the food products are meat products or fish products, preferably dry sausages or ham.

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(57) Abstract

The invention relates to a food casing and more particularly to a breathable polymer food casing for stuffing food products, such as meat products like dry sausages and to a method for the manufacture thereof. Additionally, the invention relates to the use of a film or casing which is permeable to water vapour for dehydrating and/or maturing food products and more particularly to the use of films which are permeable to water and which are continuous, that is to say which do not comprise perforations. The casing and/or film comprises thermoplastic polymer having polyether chains and with a moisture vapour transmission rate (MVTR) of more than 500 $g/m^2/24$ hours, preferably 1000 - 20,000 $g/m^2/24$ hours measured by the ASTM E96 BW method.